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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,941	02/12/2004	Il-Joo Cho	10061-17U1 (P02000-11US/D)	5358
570	7590	04/05/2005	EXAMINER	
AKIN GUMP STRAUSS HAUER & FELD L.L.P. ONE COMMERCE SQUARE 2005 MARKET STREET, SUITE 2200 PHILADELPHIA, PA 19103-7013			VANORE, DAVID A	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/777,941	CHO ET AL.	
	Examiner	Art Unit	
	David A. Vanore	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,11 and 12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/598656.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

Applicant's arguments filed January 18, 2005 have been fully considered but they are not persuasive.

Applicant has argued that claims 1, 3-5 and 11-12 are patentable because Toda et al. (USPN 5,386,720) fails to teach a silicon substrate having a <110> directional crystal structure. The examiner disagrees. As shown in Fig. 3E and 6, the silicon wafer has a <110> direction structural feature. The term "<110>" is notation for describing planes in a crystalline lattice, known in the art as Miller Index notation. As shown in Toda et al., the substrate is shown to have a structure corresponding to the <110> surface as pointed out previously.

Applicant's remarks at the second paragraph of page 6 of the response misinterpret the teaching of Toda et al. Toda et al. at Col. 6 Lines 11-13 read, "At this time, the resist the patterning shape extending in the <110> direction of the silicon wafer as shown in Fig. 3E" (Emphasis added). Therefore, the silicon wafer, the substrate, has a <110> direction associated therewith.

The substrate therefore "has a <110> directional crystal structure."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 stand rejected and claims 11 and 12 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Toda et al. (5,386, 720).

Toda et al. teaches a method of fabricating a probe comprising the following:

Regarding claims 1 and 12, Toda et al. teaches:

- A method of fabricating a probe including a cantilever 12, a body 16 supporting the cantilever and a tip 14 formed at an end of the cantilever, comprising the steps of:
- forming a first mask layer 60 and 58 on an area of a silicon substrate to be formed with the body and the tip (Fig. 3A)
- etching the silicon substrate in a predetermined depth using the first mask layer to form the tip (Fig. 3B)
- removing the first mask 60 and forming a second mask layer 64 on an area of the silicon substrate except for an area to be formed with the body and the cantilever
- forming a boron-diffused layer 56 and 68 by diffusing boron into an area to be formed with the cantilever and a predetermined area of the body using the second mask (Col. 6 Lines 1-10)
- removing the second mask layer (64) and forming a third mask layer (66 and 74) on the boron-diffused layer (68)
- etching the silicon substrate 52 using the third mask layer to form the body and the cantilever Fig. 3H through Fig. 3J where the third mask

layer in the process illustrated in Fig. 3H through Fig. 3J is anisotropically etched using ethylene diamine pyrocatechol (EDP) taught in Toda et al. at Col. 6 Lines 23-35 and Col. 5 Lines 63-65.

Regarding claim 2, Toda et al. teaches that the silicon substrate has a 110 directional crystal structure (Fig. 6).

Regarding claim 3, Toda et al. teaches that the mask layers are composed of silicon dioxide (Col. 5 Line 49 through Col. 6 Line 24).

Regarding claim 11, the boron diffused layer inherently serves as an etch stop layer in an anisotropic etch process. Examiner cites USPN 5,021,364 to Akamine et al. at column 7 lines 30-36 where Akamine et al. teaches that when silicon is implanted with boron, it serves as an etch stopping means.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-5 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Toda et al. as applied to claim 1 above, and further in view of Senoue et al. (4,581,101).

Regarding claims 4 and 5, Toda et al. teaches all the limitations as pointed out in regards to claim 1 and further teaches the use of anisotropic dry etching as an etching process which is reactive ion etching at Col. 6 Lines 1-25.

Toda et al. fails to disclose the step of etching using SF₆, He and O₂ gases.

Senoue et al. teaches a dry etch process which utilizes SF₆, He and O₂ gases at Col. 4 Lines 1-8 and further discloses that the gases are well known. Senoue et al. further teaches that variation of gas ratio, as recited in claim 5, causes polymer formation. The formation of polymer residue at a tip diminishes the sharpness of said tip by virtue of the presence of the polymer residue (Note Senoue et al. Col. 4 Line 15-40).

Absent any criticality to the etching process claimed and given that SF₆, He and O₂ gases are disclosed in Senoue et al., it would have been obvious to one having ordinary skill in the art to utilize SF₆, He and O₂ gases in a reactive ion etching process because their use is disclosed as being well known in Senoue et al. as etching gases in a reactive ion etch process or dry etch process.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Vanore whose telephone number is (571) 272-2483. The examiner can normally be reached on M-F 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dav



JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800